

Evaluation of a Modified Physical Conditioning Program for Female Marine Corps Recruit Training



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**NHRC San
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Modified Physical Fitness Conditioning Program for Female Marine Corps Recruit Training



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Physical Fitness Conditioning Program Modifications

- **Include running mechanics training by adding 110 meter striders at the start and finish of PT sessions.**
 - **Stride the straightway, walk the curves**
 - **Four beginning (after Daily-16 warm up) and four at the end (before Daily-16 cool down) of PT session**
- **Decreased other running distances to minimize total mileage increase due to addition of striders.**
 - **2.75 miles total mileage increase**

Physical Fitness Conditioning Program Modifications, Cont.

- **Eliminated formation runs**
 - Replaced with individual effort, squad, and Indian runs
 - Kept the TD54 platoon and the TD63 Graduation formation runs
- **Eliminated running on pavement**
 - Developed an extended dirt track
 - All non-evaluated runs were on dirt track

Mid-Test RTR Depot-Wide Changes (Effective 02 August 1999)

- **Allow recruits to be accustomed to wearing boots**
 - **Alternate boots and running shoes during the first four weeks of training.**
- **Eliminate running on pavement**
 - **All training runs will be done on a dirt track surface.**

Study Implementation Summary

- **Series 4028:** no test protocols, dirt track running started during sixth week of training.
- **Series 4030:** Test protocols.
- **Series 4032:** Alternate running shoes and boots for two weeks plus test protocols.
- **Series 4034:** Alternate running shoes and boots for first four weeks plus test protocols.
- **Series 4036 and 4038:** Alternate running shoes and boots for first four weeks plus running on dirt track, rescind remaining Test Protocols.

Evaluation of a Modified Physical Fitness Conditioning Program for Female Marine Corps Recruit Training

Abstract

- Physical training recommendations to the female Marine Corps recruits' program of instruction (POI).
- The prevention strategy was implemented in 1995. The study population for the 1995-1996 studies (N=2,962) as well as the 1999 study (N=822) included Marine Corps recruits attached to the 4th Recruit Training Battalion at Parris Island. Only female recruits are assigned to the 4th Battalion, so men were not enrolled in these studies.
- Recruits were followed through training for injuries, initial strength test (IST) and physical fitness test (PFT) measurements, Crucible Event success, and graduation success.

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Learning Objectives

- **1. Quantification of acute and overuse injury rates for the entire population (Series 4028 through 4040) and by Group.**
- **2. Attempt to answer the question:**
 - **Did the physical training recommendations to the female Marine Corps recruits' program of instruction (POI) made by the 4th Battalion Commanding Officer and the Support Training Battalion Physical Fitness Advisor, reduce the number of stress fractures and the overall musculoskeletal injury rate while maintaining high-intensity physical activity?**

The Entire Population Characteristics and IST Run

Variable

N=822

-
- **Graduated on-schedule 648 (78.8%)**
 - **Graduated 728 (88.6%)**
 - **Separated 94 (11.4%)**
 - **Age (yr) 18.4 (SD 1.5)**
-
- **Height (in) 64.3 (2.5)**
 - **Weight (lbs) 125.6 (14.7)**
 - **BMI (kg/m²) 21.5 (2.0)**
-
- **IST Run Time 1.5-mile**
13:28 (1:15)
pace/mi 8:58

The Entire Population Injuries

| Injury category | N = 822 | |
|------------------------------------|---------|---------|
| • All Injuries | 488 | (59.4%) |
| • Acute | 231 | (28.1%) |
| • Overuse | 389 | (47.3%) |
| • Stress fracture | 56 | (6.8%) |
| • Pelvic / Femoral stress fracture | 16 | (1.9%) |
| • Blisters | 105 | (12.8%) |
| • Tend/Burs Ankle/Foot | 102 | (12.4%) |
| • Ankle sprain/strain | 99 | (12.0%) |
| • Tend/Burs Knee/Lower Leg | 74 | (9.0%) |
| • Hip sprain/strain | 53 | (6.5%) |
| • Shoulder/Upper Arm | 48 | (5.8%) |
| • Back sprain/strain | 29 | (3.5%) |
| • Knee sprain/strain | 17 | (2.2%) |
| • Tend/Burs Hip/Pelvis/Thigh | 14 | (1.7%) |

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Data Analyses by Group

- **Total number of recruits shipped between June and September 1999 was 891**
- **Total number of recruits enrolled in the study was 822.**
- **Group 1 Platoons 4028-4029 n=128**
 - **"Control Group"**
- **Group 2 Platoons 4030-4031 n=122**
 - **4th Battalion physical training changes, equipment changes including running shoes and braziers.**
- **Group 3 Platoons 4032-4041 n=572**
 - **4032-4035 Depot wide changes like alternating running shoes and boots. n=238**
 - **4036-4041 Depot wide changes stay in effect, rescind 4th Battalion physical training changes. n=334**

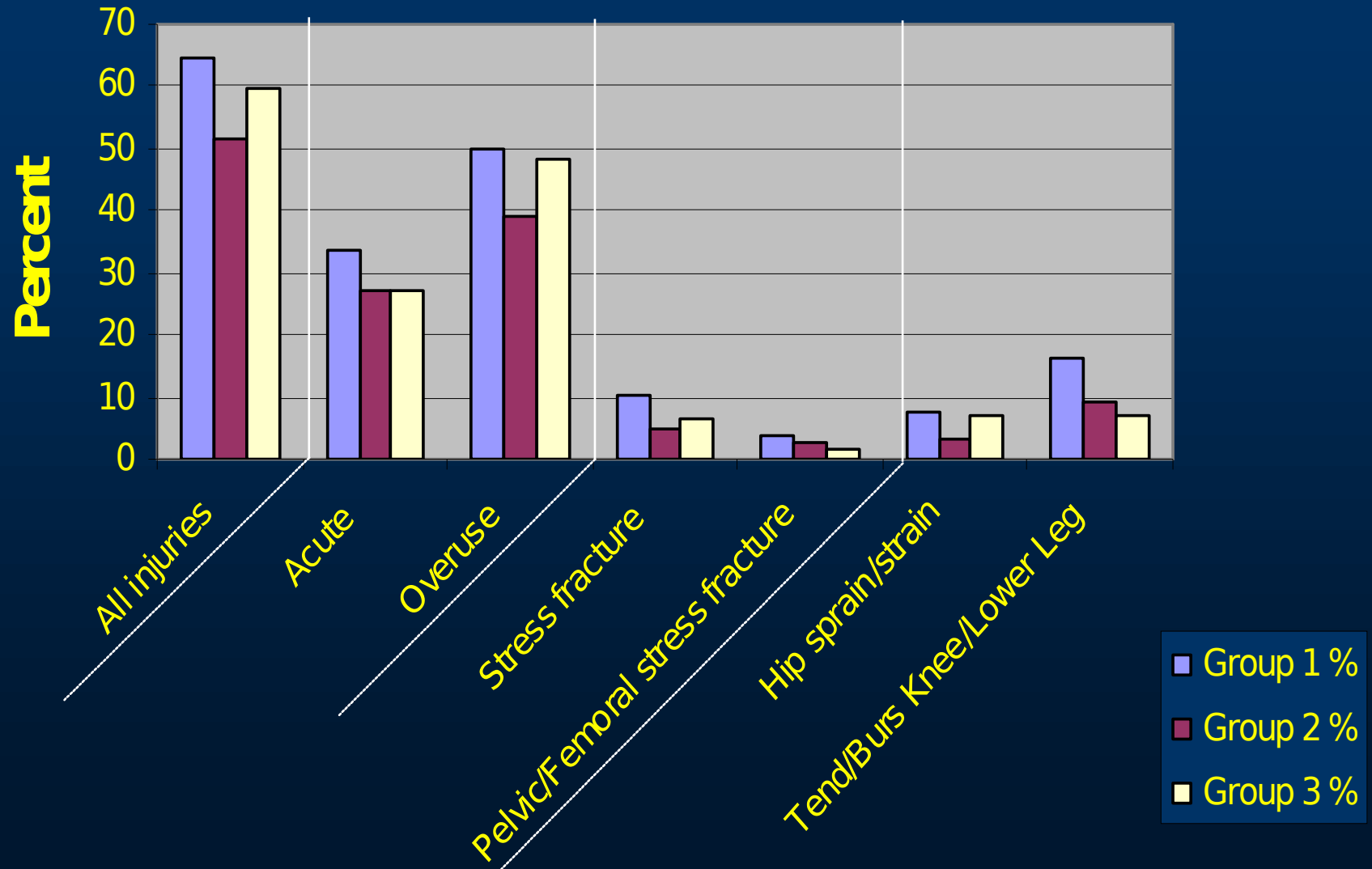
Injuries by Group

| Injury category | Group 1 | Group 2 | Group 3 |
|----------------------------|------------|------------|---------------------|
| • All Injuries | 83 (64.8%) | 63 (51.6%) | 342 (59.8%) |
| • Acute | 43 (33.6%) | 33 (27.0%) | 155 (27.1%) |
| • Overuse | 64 (50.0%) | 48 (39.3%) | 277 (48.4%) |
| • Stress fracture | 14 (10.4%) | 6 (4.9%) | 36 (6.3%) |
| • Pelvic/Femoral stfx | 5 (3.9%) | 3 (2.5%) | 8 (1.4%) |
| • Hip sprain/strain | 10 (7.8%) | 4 (3.3%) | 39 (6.8%) |
| • Tend/Burs Knee/Lower Leg | | 21 (16.4%) | 11 (9.0%) 42 (7.3%) |

Relative Risk

| Injury category | | Group 1 vs. Group 2 | Relative Risk |
|----------------------------------|------|---------------------|------------------|
| | | (p-value) | (95% CI) |
| • All Injuries | 0.03 | 1.26 | (1.01,1.56) |
| • Acute | 0.26 | 1.24 | (0.85,1.82) |
| • Overuse | 0.09 | 1.27 | (0.96,1.68) |
| • Stress fracture | 0.08 | 2.22 | (0.88,5.60) |
| • Pelvic/Femoral Stress fracture | | 0.52 | 1.59 (0.39,6.50) |
| • Hip sprain/strain | 0.12 | 2.38 | (0.77,7.40) |
| • Tend/Burs Knee/Lower Leg | 0.08 | 1.82 | (0.92,3.61) |

Injuries by Group



Physical Fitness Test Run Times

| Group | Run Time Mean (SD), Range | p=value |
|------------------------|-----------------------------|-----------------|
| IST 1.5-mi Run | | |
| All Recruits n = 813 | 13:28 (1:15), 9:10 - 17:42 | X |
| • 1 n = 127 p=0.02 | 13:05 (1:22), 9:10 - 16:20 | 1 vs. 2 |
| • 2 n = 122 NS | 13:29 (1:17), 9:54 - 16:40 | 2 vs. 3 p=0.80 |
| • 3 n = 564 | 13:31 (1:26), 9:32 - 17:42 | 1 vs. 3 p=0.002 |
| PFT 3.0-mi Run | | |
| All Recruits N = 822 | 26:14 (2:23), 19:20 - 37:19 | X |
| • 1 n = 128 | 27:50 (2:45), 19:20 - 33:08 | 1 vs. 2 p=0.001 |
| • 2 n = 122 p=0.001 | 26:43 (2:30), 20:00 - 32:14 | 2 vs. 3 |
| • 3 n = 572 | 25:24 (2:16), 19:50 - 37:19 | 1 vs. 3 p=0.001 |

Stress Fracture Outcome

- **Stress Fracture**

**n=56 Graduated 32 (57.1%) Separated
24 (42.9%)**

- **Pelvic or Femoral Stress Fracture**

**n=16 Graduated 10 (62.5%) Separated 6
(37.5%)**

- **Compared to the Total Population**

**N=822 Graduated 728 (88.6%) Separated
94 (11.4%)**

Injuries by Training Day

Training Days presented in Four Week
Intervals

| Training Day Injured Recruit | Injuries | Recruits Injured | per |
|----------------------------------|-----------------------|-----------------------|-----------------------|
| TD 0 to TD 23 | 573 | 302 | 1.9 |
| TD 24 to TD 47 | 454 | 276 | 1.6 |
| TW 1 to TD 64 | 395 | 240 | 1.6 |
| Total | 1422 | 488 | 2.9 |

Crucible Event TD57 to TD64

| | Injuries Reported | | Recruits Injured | Outcome |
|---------------------|-------------------|-----|------------------|----------------------------|
| All Injuries | 166 | 119 | 116 Grad | 2 Grad Hold 1 Separated |
| Acute & Overuse Inj | 112 | 81 | | |
| Acute Injuries | 44 | | | |
| Overuse Injuries | 68 | | | |
| Stress Fracture | 10 | 9 | 4 Grad | 6 Grad Hold 0 Separated |
| Pelvic or Femoral | 4 | 4 | 4 Grad Hold | |
| Stress Fracture | | | | 0 Separated |

Crucible Event TD57 to TD64

Injuries Reported

Recruits Injured

| | | |
|---------------------------------|----|----|
| • Blisters, Ankle/Foot/Toes | 48 | 48 |
| • Ankle Sprain | 16 | 15 |
| • Hip Flexor Strain | 10 | 10 |
| • Tendonitis, Ankle/Foot | 8 | 7 |
| • Hip/Pelvis/Groin Pain | 7 | 7 |
| • Shin Splints | 6 | 6 |
| • Patellofemoral Syndrome | 6 | 6 |
| • Iliotibial Band Syndrome | 5 | 5 |
| • Fracture (2nd/3rd metatarsal) | 4 | 4 |

Conclusions

The physical training recommendations to the female Marine Corps recruits' program of instruction, made by the 4th Battalion Commanding Officer and the Support Battalion Physical Fitness Advisor, significantly reduced the number of stress fractures and the overall injury rate while maintaining high-intensity physical activity.

Cost Analyses

- Does not include:

- medical separation pay
- facilities fees
- direct nor indirect personnel costs

- Does include:

- 1999 salary and chow cost

E-1 < 4 mo. \$909.00/mo.
\$30.30/day

E-1 > 4 mo. \$982.50/mo.
\$32.75/day

E-2 Graduates \$1,101.60/mo.
\$36.72/day

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Cost Analyses by Series

| Series | Grad on schedule | Grad |
|------------------|--------------------|--------------------|
| Separated | | |
| 4028-4029 | 100 (78.1%) | 109 (85.2%) |
| 19 | | |
| n=128 | | |
| 4030-4031 | 96 (78.7%) | 112 (91.8%) |
| 10 | | |
| n=122 | | |
| Total | 196 (78.4%) | 221 (88.4%) |
| n=250 | | 29 |

Other Cost Metrics

| Series | Total PI Days | Recruit Salary and |
|------------------|----------------------|----------------------------|
| Chow | | |
| 4028-4029 | 12,145 | \$471,040.24 |
| n=128 | 111 per Grad | \$4,321.47 per |
| Grad | | |
| 4030-4031 | 11,471 | \$443,854.06 |
| n=122 | 102 per Grad | \$3,962.98 per Grad |
| Total | 23,616 | \$914,894.30 |
| n=250 | 107 per Grad | \$4,139.79 per Grad |

PCP

MRP

| Series → | 4028-4029 | | 4030-4031 |
|------------------|-----------|-----|-----------|
| PCP recruit | 5 | 2 | |
| PCP days | 126 | | 28 |
| days per recruit | 25 | | 14 |
| MRP recruit | 12 | 8 | |
| MRP days | 654 | | 465 |
| days per recruit | 55 | 58 | |
| MRP w/stfx | 9 | | 3 |
| MRP w/stfx days | 568 | 246 | |
| days per recruit | 63 | 82 | |

BMP Grad Hold

| Series → | 4028-4029 | 4030-4031 |
|--------------------|-------------|-------------|
| BMP recruit | 8 | 4 |
| days | 384 | 224 |
| days per | 48 | 56 |
| total cost | \$17,249.28 | \$10,062.08 |
| cost per recruit | \$2,156.16 | \$2,515.52 |
| BMP recruit w/stfx | 4 | 3 |
| days | 267 | 205 |
| days per | 67 | 68 |
| total cost | \$11,993.64 | \$9,208.60 |
| cost per recruit | \$2,998.41 | \$3,069.53 |

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